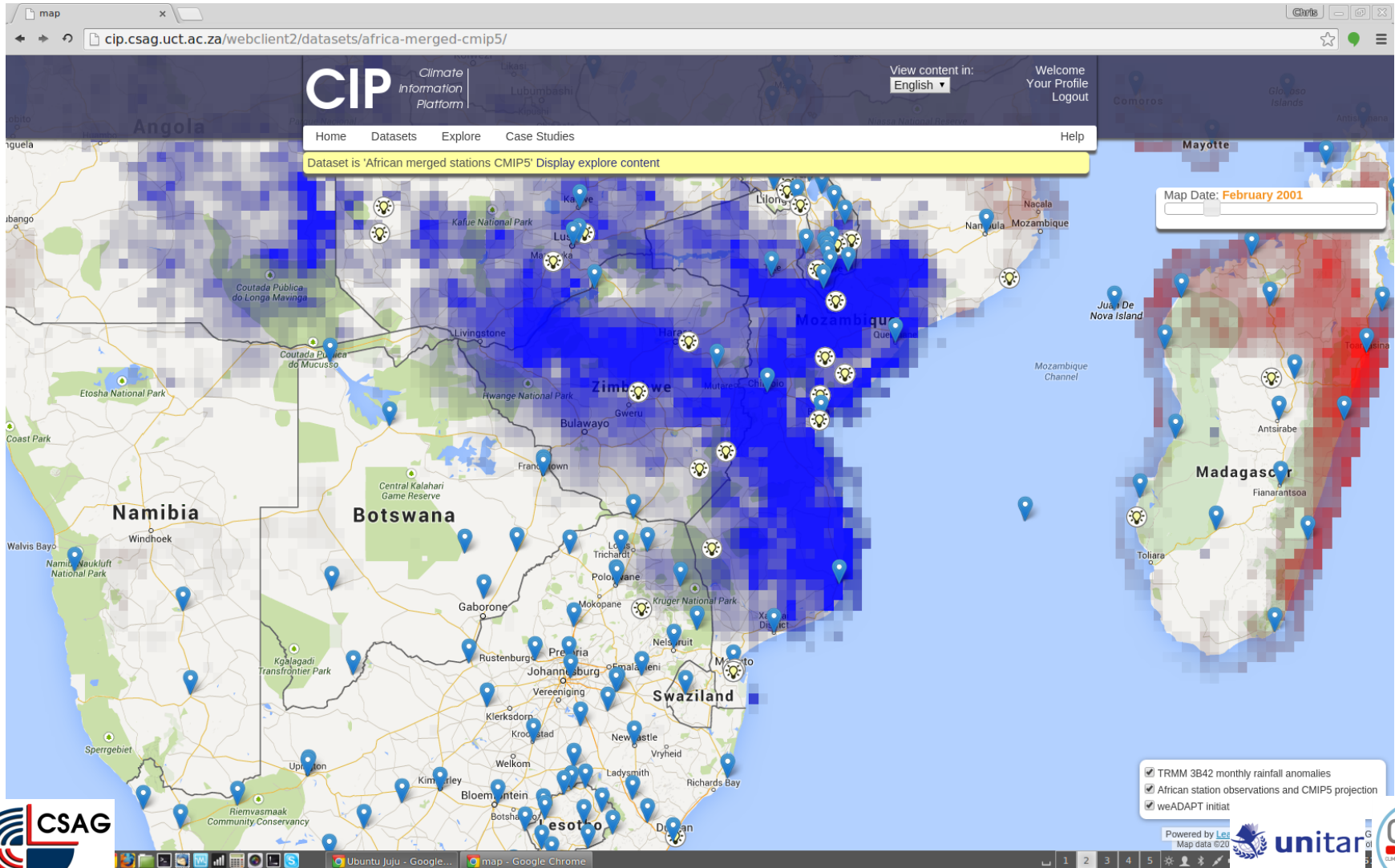


# The CSAG Climate Information Platform

<http://cip.csag.uct.ac.za>



# The CSAG Climate Information Platform

*<http://cip.csag.uct.ac.za>*

## Overview

- Who we are and why we did this
- What CIP provides
- Integration with other platforms
- Embedded tools
- Challenges
- But what are we really doing?

# Who are CSAG?

Understanding the regional climate system in order to inform real world decision making (in Africa)

- ✓ Dynamical modelling (CORDEX ++)
- ✓ Statistical downscaling
- ✓ Extremes modelling and analysis
- ✓ Hydro/Agri impacts
- ✓ Climate change/seasonal forecasting
- ✓ “User” engagement (government, NGO, research)
- ✓ Training and “climate services”

# The CSAG Climate Information Platform

*<http://cip.csag.uct.ac.za>*

Why did we do this?

1. CSAG strongly engaged with people needing climate data (information?) across Africa
2. We develop statistically downscaled climate projections data for observing station locations across Africa
3. Our INBOXes were filling up too fast as we tried to deal with all the requests

1 + 2 + 3 = We need to build something



# The CSAG Climate Information Platform

*<http://cip.csag.uct.ac.za>*

Why do it ourselves?

- ✓ Because we wanted to?
- ✓ Because we were largely focussed on station data
- ✓ Because we had our own ideas about how it should be done

How did we do it?

- ✓ Badly at first
- ✓ Very strongly tied to needs of our training workshops in Africa
- ✓ Tried to use existing tools/components
- ✓ Initial UNITAR funding but now not explicitly funded
  - ✓ USAID, CDKN

# The CSAG Climate Information Platform

<http://cip.csag.uct.ac.za>

What is NetCDF?

I only use MS Word

I have used Excel

I don't really speak English

I am an advisor to the minister of  
environment



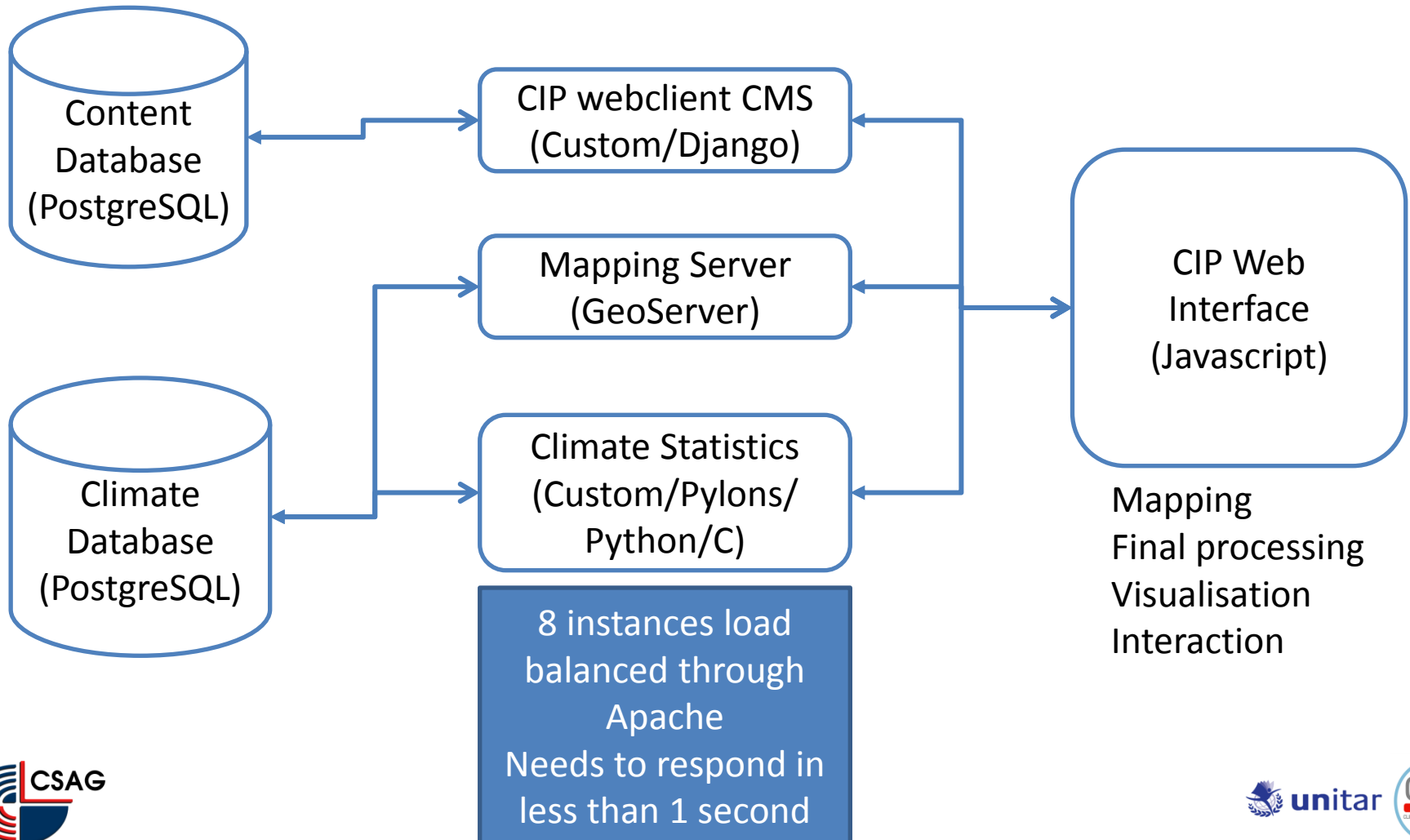
A group of people are gathered around a large table in a meeting room, looking at a large table with a NetCDF data matrix. The table is divided into columns and rows, with handwritten text and symbols. The columns are labeled: 'Poor urban Planning', 'Mangrove depletion', 'Poor drainage System', 'Poor communication between Athabasca Communities', and 'water borne disease'. The rows are labeled: 'Roads/Bridge', 'Schooling and Housing', and 'Drainage'. The data is represented by letters (M, L, H) and symbols (circles, crosses) in various colors (red, black, blue).

	Poor urban Planning	Mangrove depletion	Poor drainage System	Poor communication between Athabasca Communities	water borne disease
	M	/	M	H	M
	M	/	M	L	M
	L	H	L	H	H
	H	M	H	H	H
	H	/	H	H	/
	M	H	/	M	/
- Roads/Bridge	/	M	M	H	M
- Schooling and Housing	/	H	L	H	M
- Drainage	L	H	M	H	H



# The CSAG Climate Information Platform

<http://cip.csag.uct.ac.za>



# The CSAG Climate Information Platform

*http://cip.csag.uct.ac.za*

<http://cip.csag.uct.ac.za/climatedb/data/summary2/1/?>

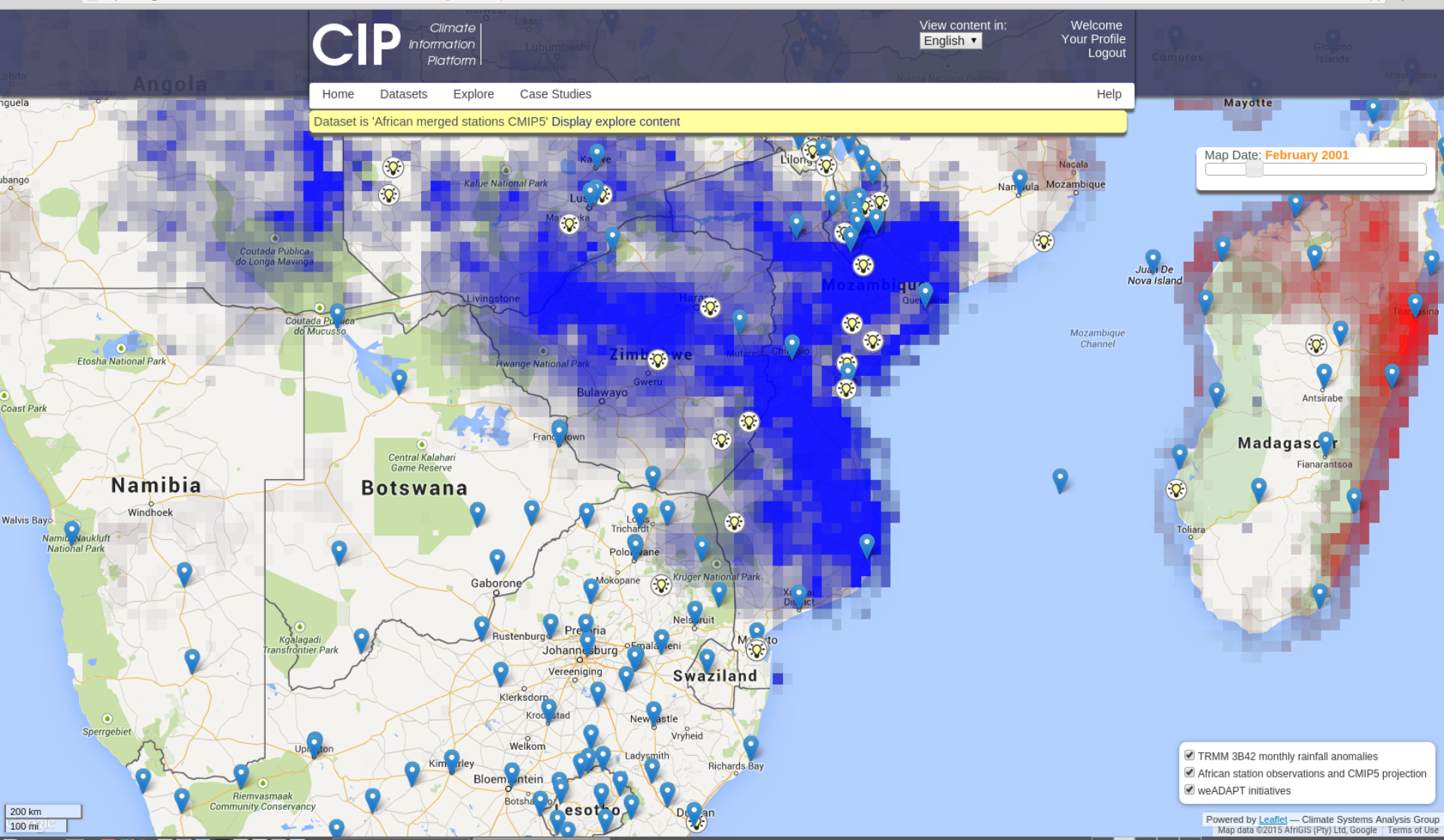
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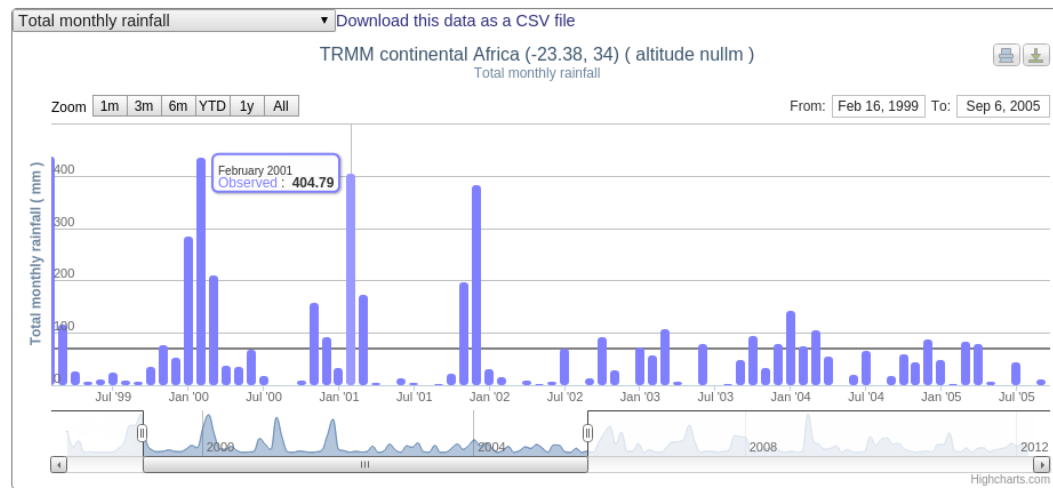
You are exploring TRMM continental Africa (-23.38, 34) (null meters) Hide this content and reveal the map

## Historical climate records

The plot below shows the historical record different climate variables for the location. This is useful for identifying particular climate events such as floods and droughts as well as observing long term variability or trends.

It is also often useful to explore the observed average seasonality, which describes the average values of variables at different times of the year.

HINT: Select different variables using the drop down menu at the top of the plot.



Mozambique  
Map Date: February 2001

- ☒ TRMM 3B42 monthly rainfall anomalies
- ☒ African station observations and CMP5 projection
- ☒ weADAPT initiatives

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Map data ©2015 Afrigis (Pty) Ltd, Google Terms of Use

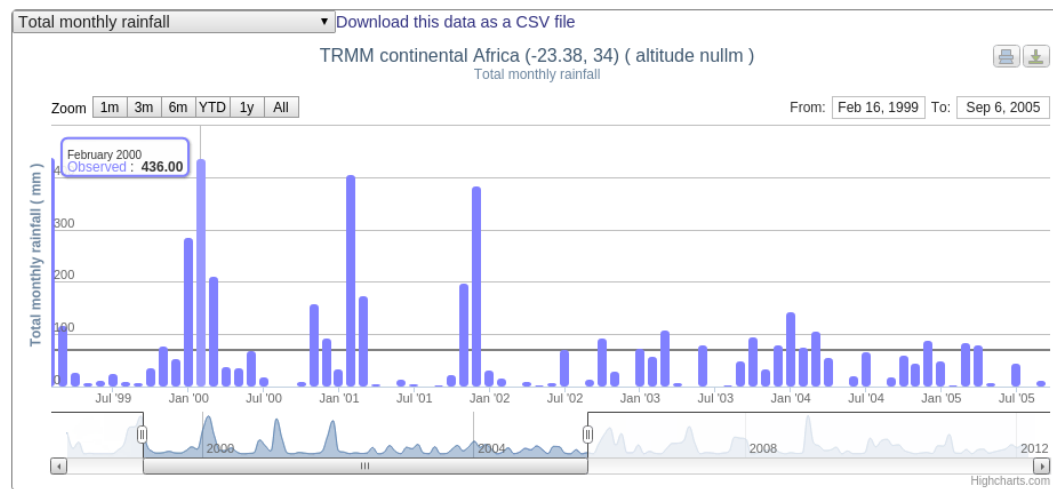
You are exploring TRMM continental Africa (-23.38, 34) (null meters) Hide this content and reveal the map ✕

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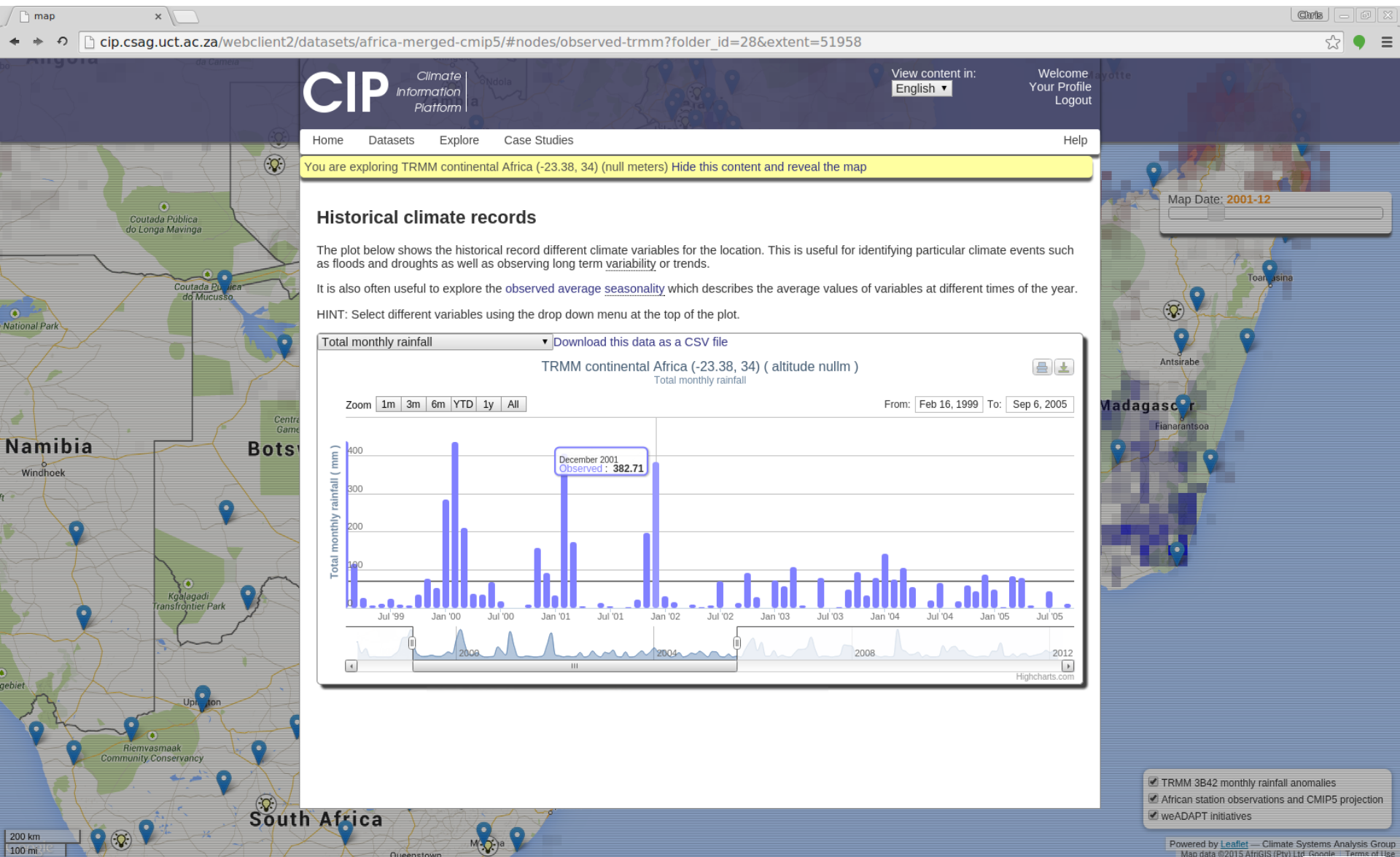
HINT: Select different variables using the drop down menu at the top of the plot.



Mozambique  
Map Date: February 2001

- ☒ TRMM 3B42 monthly rainfall anomalies
- ☒ African station observations and CMIP5 projection
- ☒ weADAPT initiatives

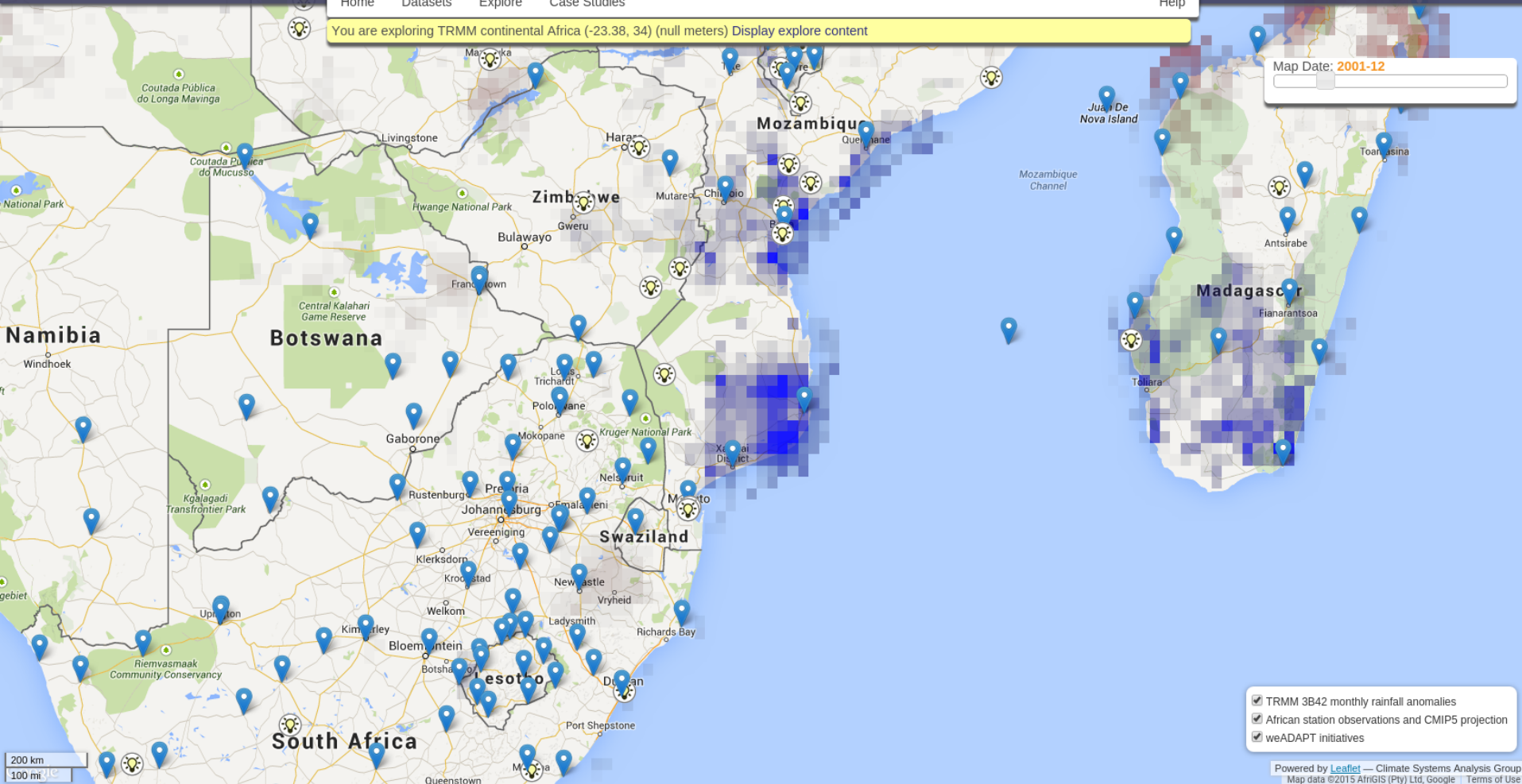
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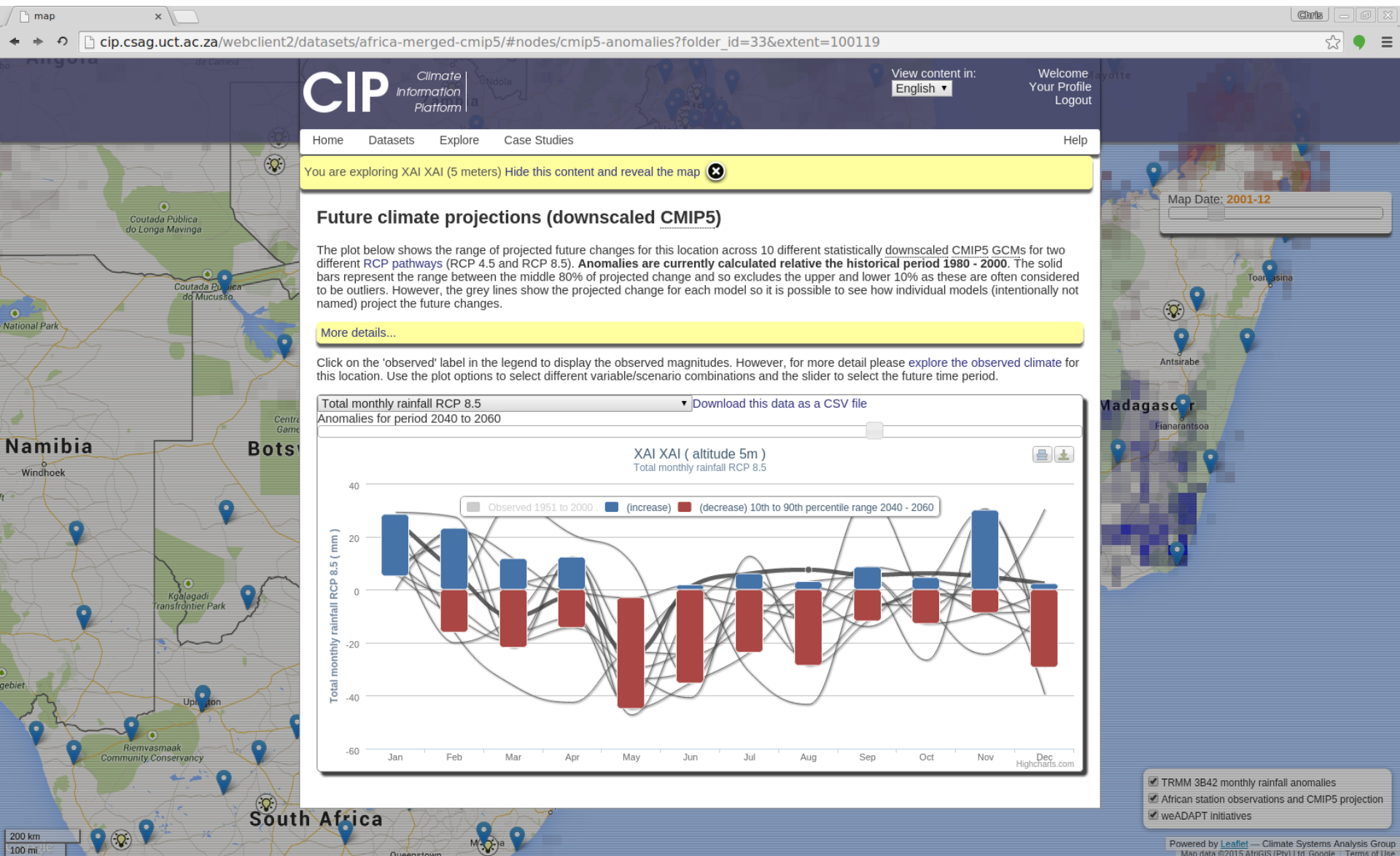


You are exploring TRMM continental Africa (-23.38, 34) (null meters) Display explore content

Map Date: 2001-12



- ☒ TRMM 3B42 monthly rainfall anomalies
- ☒ African station observations and CMIP5 projection
- ☒ weADAPT initiatives



You are exploring XAI XAI (5 meters) Hide this content and reveal the map

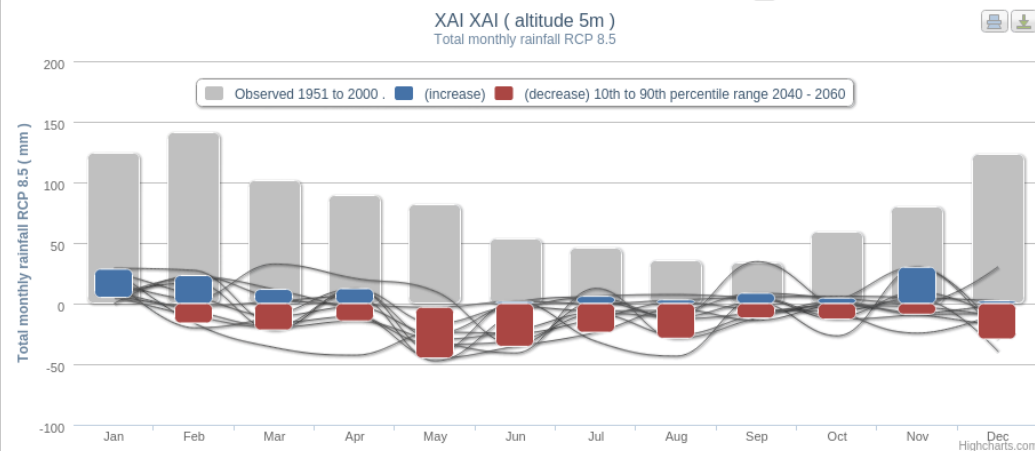
## Future climate projections (downscaled CMIP5)

The plot below shows the range of projected future changes for this location across 10 different statistically downscaled CMIP5 GCMs for two different RCP pathways (RCP 4.5 and RCP 8.5). **Anomalies are currently calculated relative the historical period 1980 - 2000.** The solid bars represent the range between the middle 80% of projected change and so excludes the upper and lower 10% as these are often considered to be outliers. However, the grey lines show the projected change for each model so it is possible to see how individual models (intentionally not named) project the future changes.

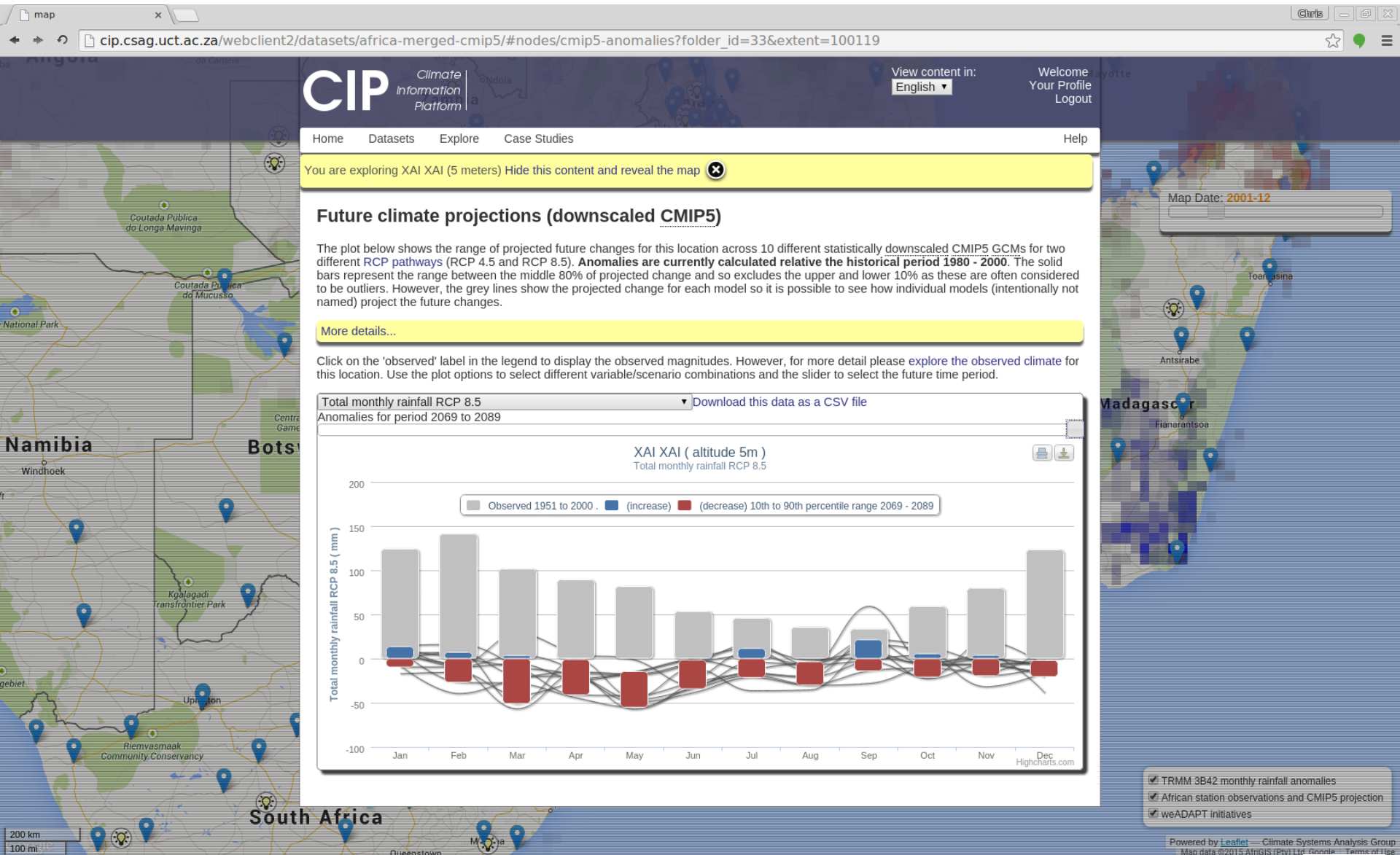
More details...

Click on the 'observed' label in the legend to display the observed magnitudes. However, for more detail please [explore the observed climate](#) for this location. Use the plot options to select different variable/scenario combinations and the slider to select the future time period.

Total monthly rainfall RCP 8.5 Download this data as a CSV file  
Anomalies for period 2040 to 2060



- ☒ TRMM 3B42 monthly rainfall anomalies
- ☒ African station observations and CMIP5 projection
- ☒ weADAPT initiatives





You are exploring XAI XAI (5 meters) Hide this content and reveal the map ✕

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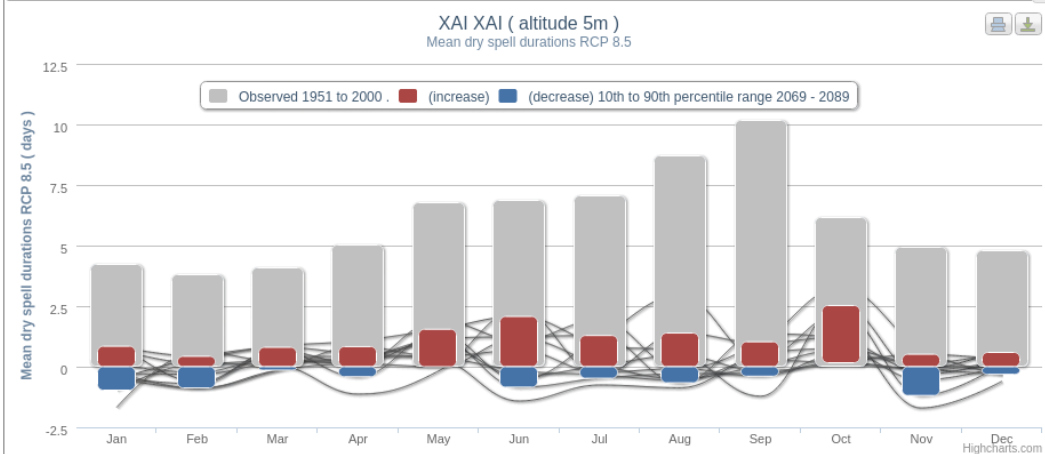
More details...

Click on the 'observed' label in the legend to display the observed magnitudes. However, for more detail please explore the [observed climate](#) for this location. Use the plot options to select different variable/scenario combinations and the slider to select the future time period.

Mean dry spell durations RCP 8.5

▼ Download this data as a CSV file

Anomalies for period 2069 to 2089



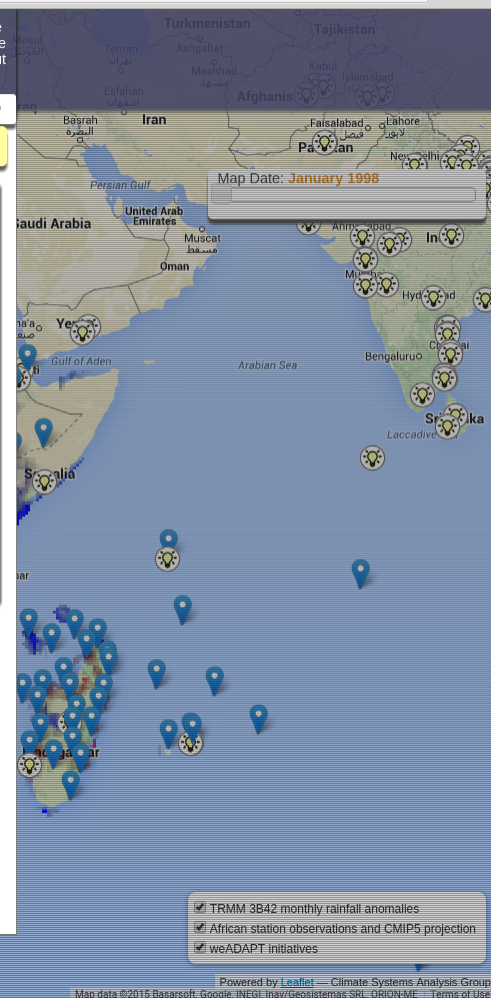
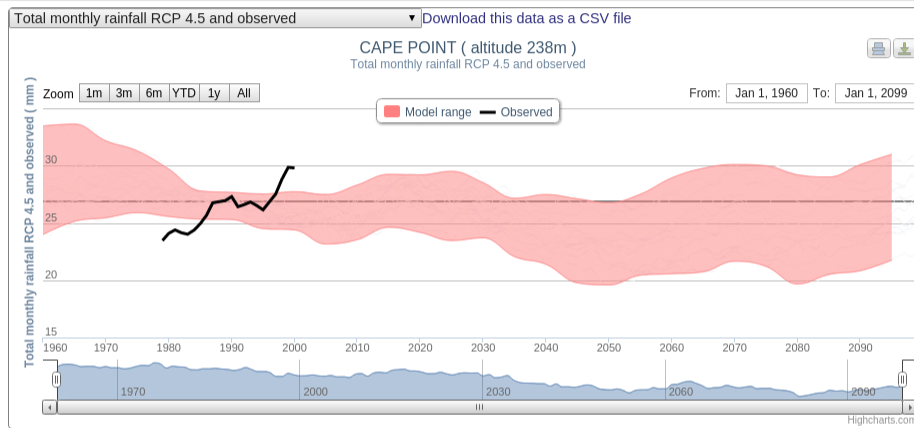
Map Date: 2001-12

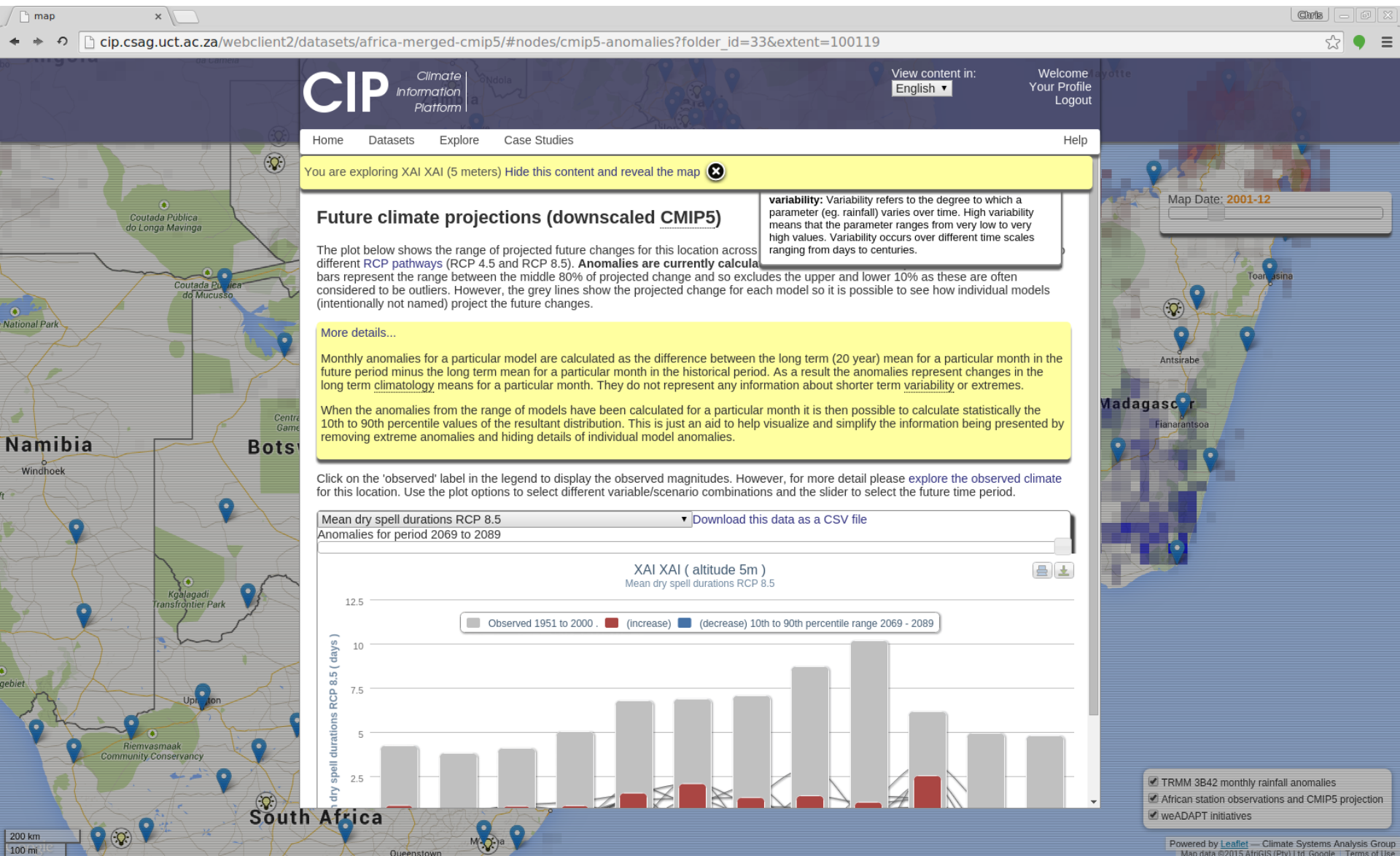
- ☒ TRMM 3B42 monthly rainfall anomalies
- ☒ African station observations and CMIP5 projection
- ☒ weADAPT initiatives

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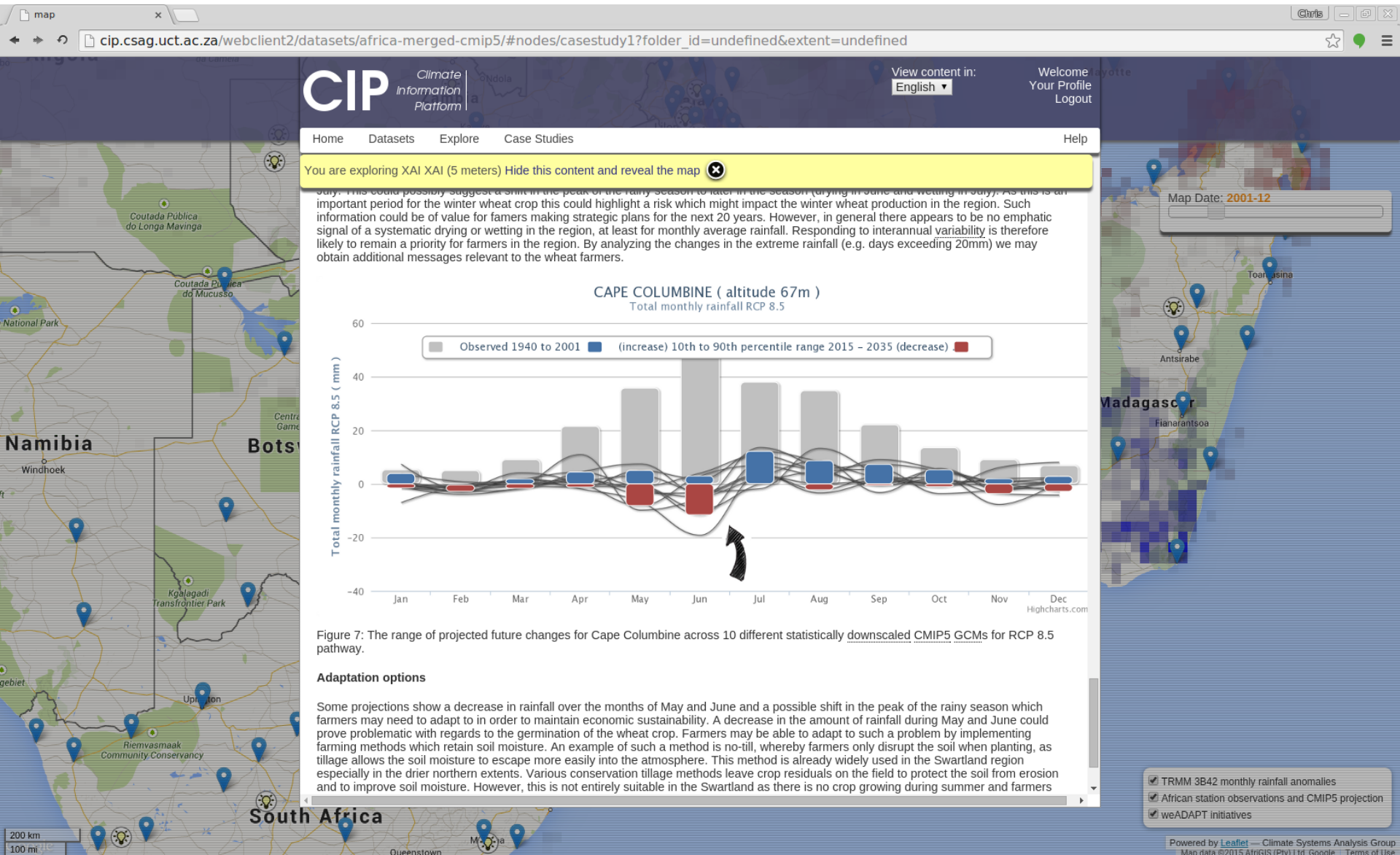



A																
1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
2	Station ID	Name	Latitude	Longitude	Altitude											
3	MZ000067335	XAI XAI	-25.05	33.63	5											
4	params															
5																
6	Future Projected ppt (monthly_spell_lengths) RCP8.5															
7	date (YYYY-MM)	MIROC-ESM	CNRM-CM	CanESM2	FGOALS-s2	BNU-ESM	MIROC5	GFDL-ESM2G	MIROC-ESM-CHEM	GFDL-ESM2M	MRI-CGCM3	bcc-csm1-1				
8	1960-01	6.57	3.07	4.1	4.55	5.78	2.53	2.8	3.82	3.23	2.4	6.3				
9	1960-02	2.43	2.37	4.09	4.4	2.86	2.25	2.43	2.33	2.57	2.09	5.26				
10	1960-03	3.02	2.84	2	3.08	4.6	3.94	3.08	2.84	2.12	2.05	2.62				
11	1960-04	4	3.5	2.71	6.27	2	2.79	2	5.25	2.71	2.57	4.33				
12	1960-05	2.75	6.14	4.6	7.8	3.5	3.5	2.38	4.4	3.33	3.17	2.82				
13	1960-06	3.89	5.37	6.25	3.83	2.5	2.86	2.25	2.62	2.86	2.35	2.35				
14	1960-07	2.69	5.24	3.4	4.47	4.32	2.17	2.73	3.74	3.15	1.95	2.08				
15	1960-08	4.78	8.16	5.87	7.12	6.53	3.71	2.37	3.36	3.33	3.71	3.7				
16	1960-09	3.2	17.16	12.97	9.84	5	6.05	3.28	7.45	4.4	3.39	4.28				
17	1960-10	3.2	4.29	3.98	3.59	2.7	3.2	1.71	6.05	2.16	2.67	3.85				
18	1960-11	6	4.53	5	8.16	6.25	2.71	4	4.4	3	3.43	4				
19	1960-12	4.94	4.36	6.19	26.42	5.77	5.88	3.16	5.36	4.13	4.43	4.12				
20	1961-01	2.79	3.98	3.49	3.49	2.64	3.03	2.51	2.74	2.51	2.54	3.83				
21	1961-02	3.83	4.4	3.82	3.45	3.59	3.08	4.89	4.01	2.77	2.58	13.54				
22	1961-03	2.8	4	4.17	4.65	3.41	4.53	3.76	6.24	3.71	5.11	6.03				
23	1961-04	4.83	2.78	8.81	5.49	3.24	3.48	4.97	2.66	2.14	2.59	3.74				
24	1961-05	1.89	3.48	4.18	2.53	3.69	2.86	2.13	2.42	2	2.22	3.24				
25	1961-06	4.12	4.43	4.2	2.67	3.09	1.69	2.06	1.79	1.7	1.4	3.48				
26	1961-07	5.09	5.52	3.65	7.7	3.91	17.14	5.75	4.87	5.29	1.88	5.94				
27	1961-08	2.6	4.93	4.9	2.96	2.25	2.72	2.77	3.07	2.68	2.08	4.5				
28	1961-09	9.03	7.34	7.26	10	5.22	3	5.28	3.09	3.67	4.07	9.33				
29	1961-10	3.55	3.87	10.55	3.11	2.62	2.25	2.38	3.14	3.14	2.57	3.29				
30	1961-11	4.1	3.67	4.55	7	4.6	4	4.2	4.4	4.6	3.33	4.88				
31	1961-12	5.76	4.31	4.35	4.73	4	3.17	2.11	3.65	3.33	2.67	6.83				
32	1962-01	4.44	3.43	4.55	4.55	2.8	2.47	3.38	2.62	2.12	2.42	6.71				
33	1962-02	3.68	3.62	4.22	7.5	8	4.86	4.62	3.62	4.38	4.71	5.65				
34	1962-03	2.07	2.11	2.19	3.13	2.45	1.58	1.78	1.82	1.78	2.04	2.86				
35	1962-04	5.63	5.45	4.67	10.5	5.65	4.97	7.21	7.39	3.45	5.26	5.51				
36	1962-05	3.56	2.31	4.3	4.89	4.25	3.53	2.92	4.19	2.22	3.75	2.93				
37	1962-06	5.08	4.36	3.67	4.6	6.09	3	5.68	4.7	8	3.06	4.4				
38	1962-07	4.18	2.12	5	6.71	4.13	3.5	3.4	2.98	3.5	3.33	4				
39	1962-08	4.34	9	6.71	4.15	18.59	3.26	4	6.07	3.83	3.89	6.45				
40	1962-09	2.91	6.75	8.75	4.08	4.15	2.34	2.8	5.08	2.06	2.13	4.85				
41	1962-10	4.65	7.66	14	12.22	6.52	5.05	6.06	6.13	8.85	6.63	5.43				
42	1962-11	5.28	4.48	8.24	6.13	4.33	3.04	3.16	5.5	3.28	4.14	4.07				
43	1962-12	3.5	4.16	2.71	2.57	2	1.89	1.4	1.67	1.6	2.38	2.71				
44	1963-01	2.54	2.2	2.59	5.65	2.53	1.5	1.5	3.08	2.32	1.96	3.1				
45	1963-02	2.45	3.1	2.61	3.89	3.35	1.88	2.22	5.59	2.09	2.68	6.68				
46	1963-03	2.2	4.24	4.51	7.57	7.02	4.2	2.82	10.06	2	4.18	4.26				









Dataset is 'African merged stations CMIP5' Hide this content and reveal the map 

This is a general introduction to the climate system including concepts of radiation, nature of the earth's orbit, basic circulation features and such like

**Climate Change Basics**  
by Chris Jack

Climate Change  
[Basics]



Prezi

# Integration

Strong demand for diverse, multi-disciplinary data/information

- Some funding from CDKN to explore integration with SEI weADAPT and NASA JPL RCMES
- Trying to maintain a common interface for the user
- Its difficult to develop, but harder to maintain!

Dataset is 'African merged stations CMIP5' Display explore content

Map Date: February 2001

Planning for the future and adapting to climate change in Mozambique - Lessons from ACCRA

[Go to this initiative on weADAPT](#)

## Planning for the future and adapting to climate change in Mozambique - Lessons from ACCRA



Government and civil society members playing the ACCRA game in Maputo, Mozambique

### Adaptation context

- ☒ TRMM 3B42 monthly rainfall anomalies
- ☒ African station observations and CMIP5 projection
- ☒ weADAPT initiatives

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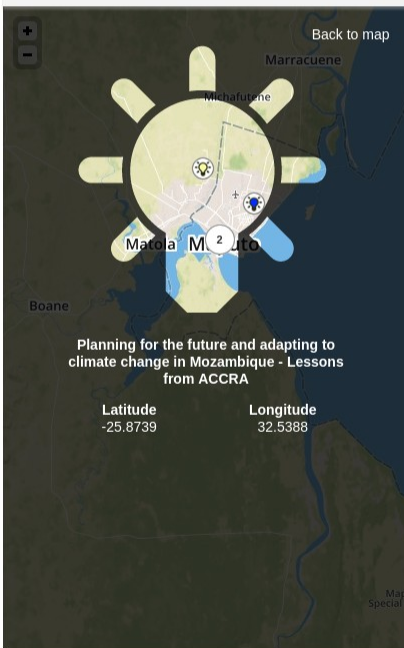
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## Planning for the future and adapting to climate change in Mozambique - Lessons from ACCRA



Government and civil society members playing the ACCRA game in Maputo, Mozambique

### Adaptation context

Mozambique is highly vulnerable to climate hazards, variability and change. More than 60% of the population live close to the country's extensive coastline and are frequently affected by cyclones and storms. Inland floods are very common as large areas are below sea level and close to the numerous large rivers flowing to the Indian Ocean. Increasingly high temperatures and unpredictable rain put the 80% of the population who are dependent on rain-fed agriculture at risk. Infertile soils, endemic diseases, poor infrastructure, low literacy and rapid population growth compound the situation.

There are strong Government commitments to disaster risk reduction and climate change issues in the country. The INGC – the National Disaster Management Institution has a presence in most areas and has worked hard to reduce the risks communities face from floods and cyclones. In addition, most development strategies include commitments to Climate Change Adaptation.

### Approach- Promoting Flexible and Forward-Looking Decision Making (FFDM)

ACCRA uses a set of research and capacity building tools to promote pro-poor and participatory climate change adaptation (CCA) and disaster risk reduction (DRR) in planning processes. Through engaging and supporting local communities, ACCRA seeks to help districts produce better plans in the face of future change and uncertainty.

ACCRA's earlier work showed that policymakers face difficult trade-offs in planning for a changing and uncertain future. Yet many development actors continue to plan for the near-term, with little room for manoeuvre or contingency. ACCRA therefore

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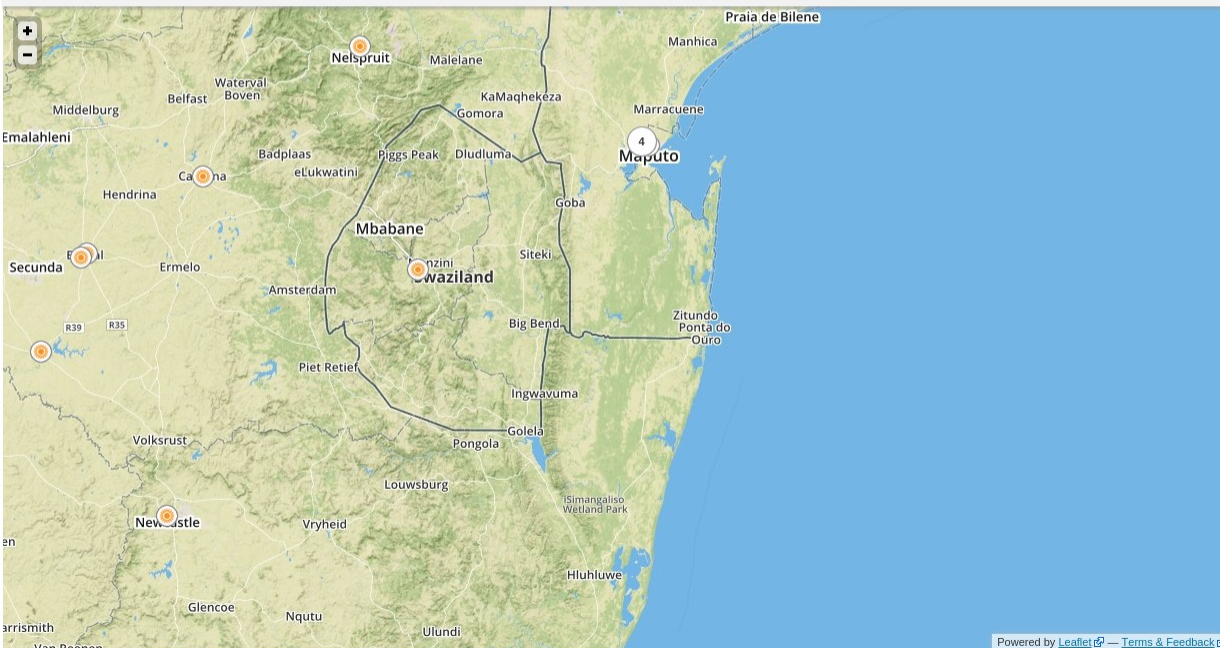
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Map of South Africa showing various locations and climate stations. The map includes labels for cities like Nelspruit, Mbabane, and Maputo, as well as climate stations marked with orange dots. The map is powered by Leaflet.

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User survey 2014: What changes would you like to see in weADAPT?

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Climate information portal data for XAI XAI

Latitude 33.63 Longitude -25.05

### Climate Summary

The plot below shows the long term monthly climatology of rainfall totals and monthly averaged minimum and maximum temperatures. This provides a useful overview over the annual seasonality for a location as it will indicate warm and cool periods as well as wet and dry periods. Different climate regimes will have very different seasonality.

[Explore this information on CIP](#)

#### Historical climate monthly averages

XAI XAI

Month	Rainfall (mm)	Tmax (°C)	Tmin (°C)
Jan	125	31.5	20.5
Feb	140	31.0	20.0
Mar	105	30.5	19.5
Apr	90	29.5	18.5
May	80	27.5	16.5
Jun	55	25.14	14.5
Jul	45	25.0	13.5
Aug	40	26.5	14.5
Sep	35	28.5	16.5
Oct	60	29.5	18.5
Nov	80	30.5	19.5
Dec	125	31.5	20.5

### More Information and Future Projections

If you would like to get more information on the observed climate for this location and explore projections of future climate conditions, downloaded from the archive of multiple GCMs, then follow the link below which will take you into the Climate Explorer.

SEI weADAPT is supported by the Stockholm Environment Institute.

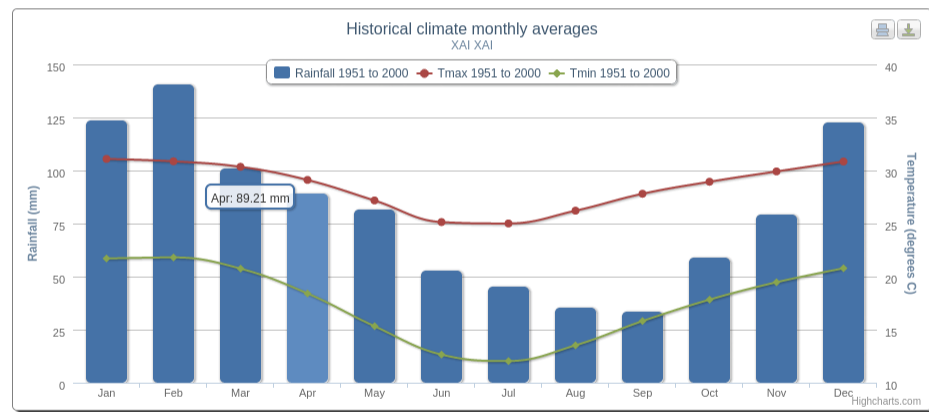
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You are exploring XAI XAI (5 meters) Hide this content and reveal the map

## Historical seasonality

The plot below shows the long term monthly climatology of rainfall totals and monthly averaged minimum and maximum temperatures. This provides a useful overview over the annual seasonality for a location as it will indicate warm and cool periods as well as wet and dry periods. Different climate regimes will have very different seasonality. These monthly climatology values are calculated from the historical monthly record data

See how this might change under future climate scenarios



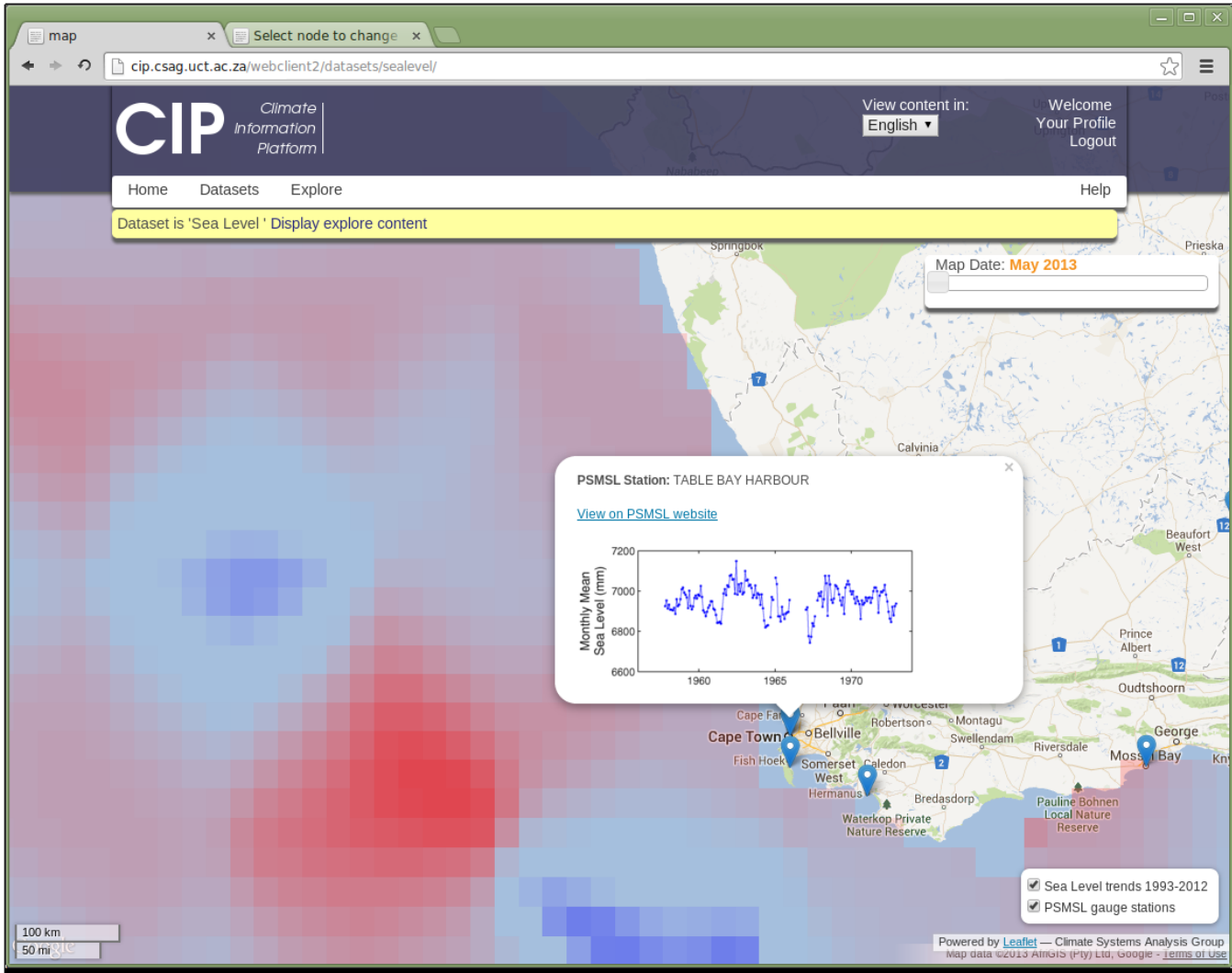
- ☒ African merged stations
- ☒ TRMM 3B42 monthly rainfall anomalies
- ☒ weADAPT initiatives

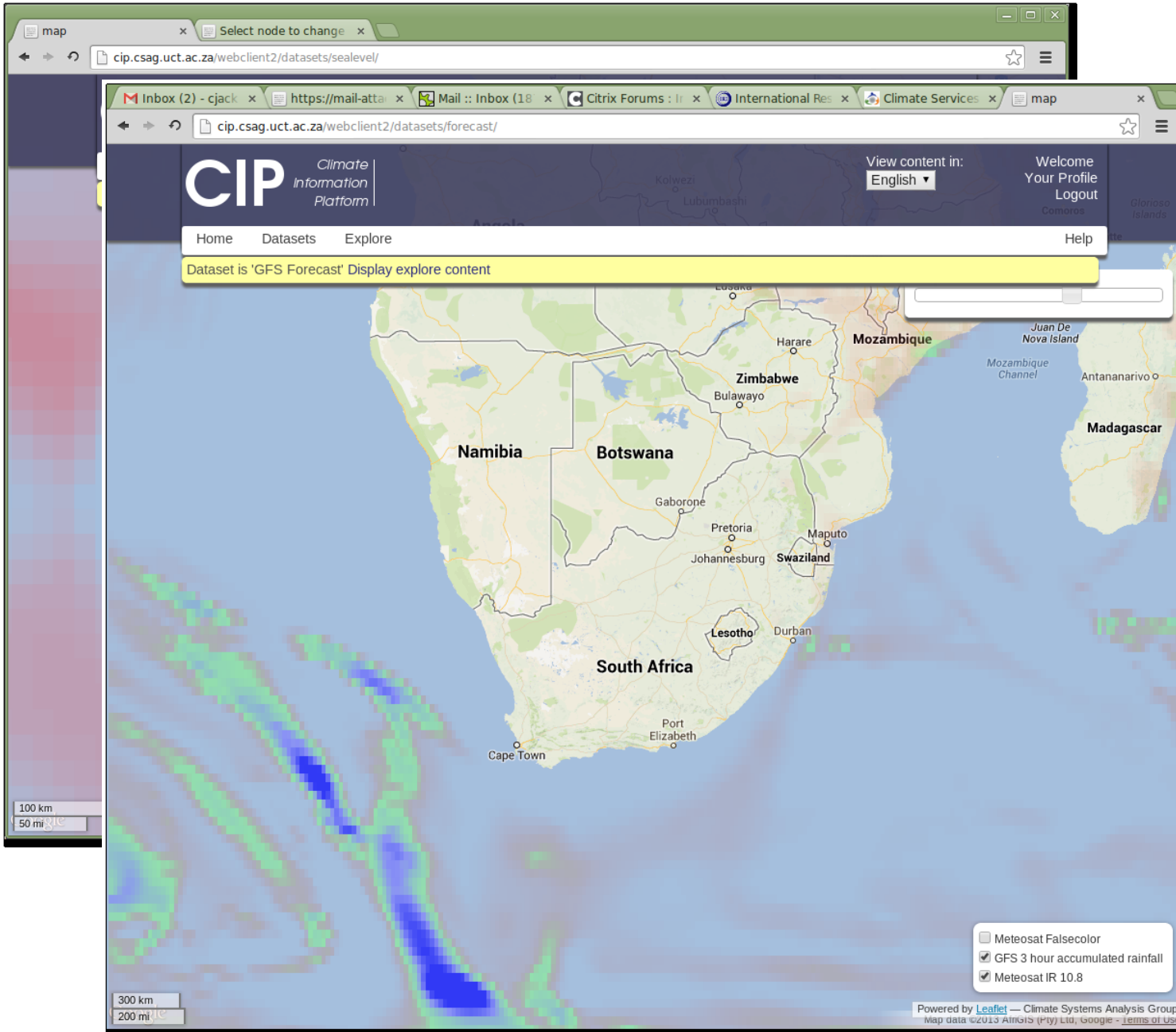


# Integration

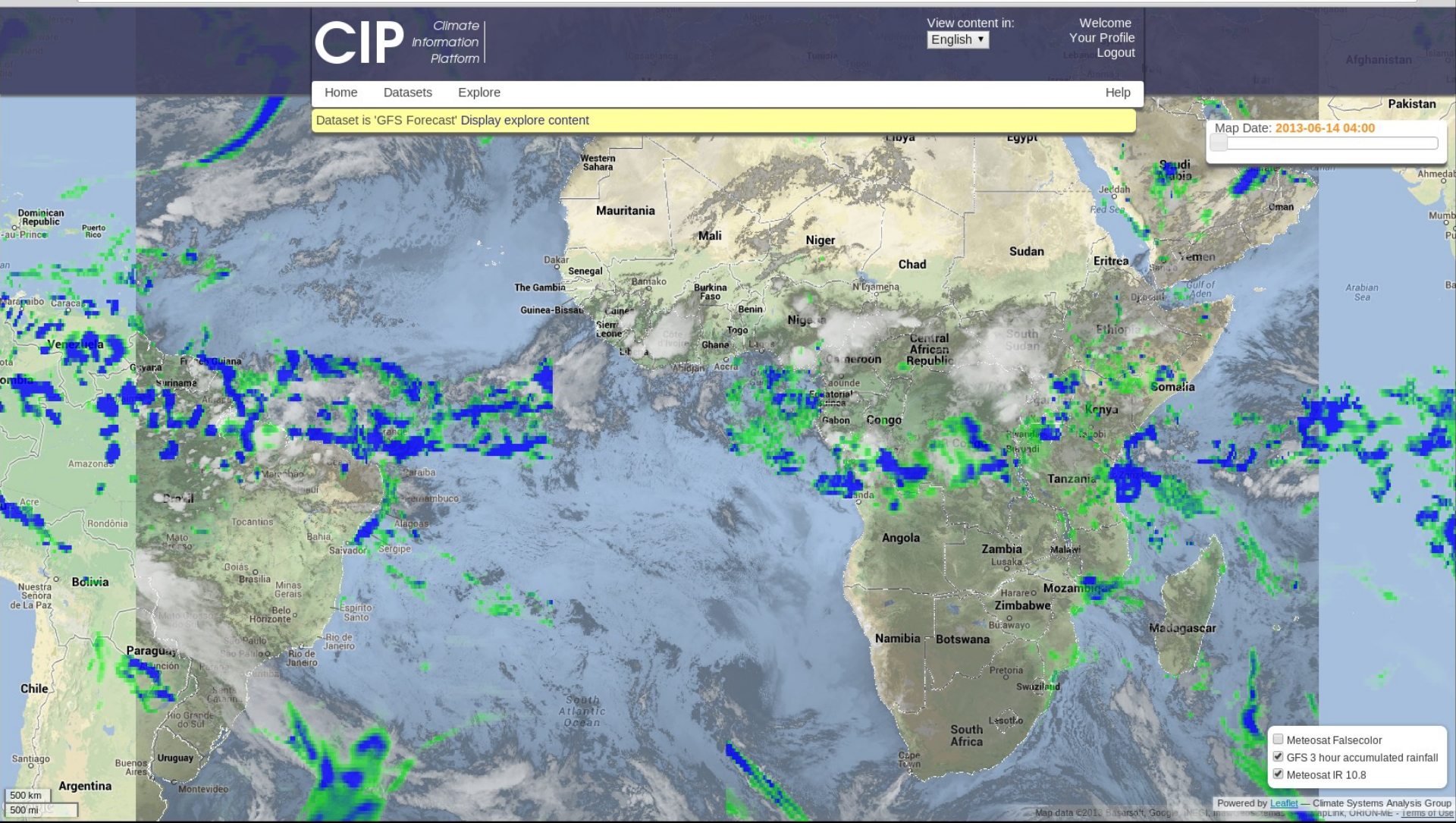
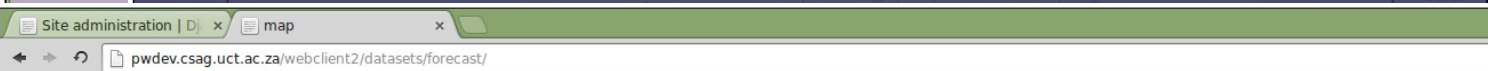
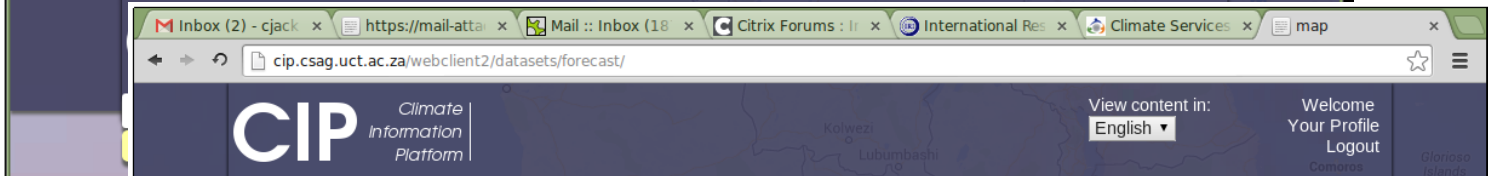
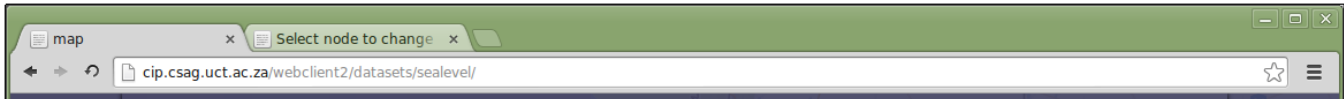
NASA JPL RCMES integration?

- ✓ Started exploring pulling TRMM data from RCMES data server
- ✓ Firewall problems
- ✓ NASA JPL focus moved onto OCW
- ✓ Actually it was just easier to host TRMM data locally in our own database...









# Embedded tools

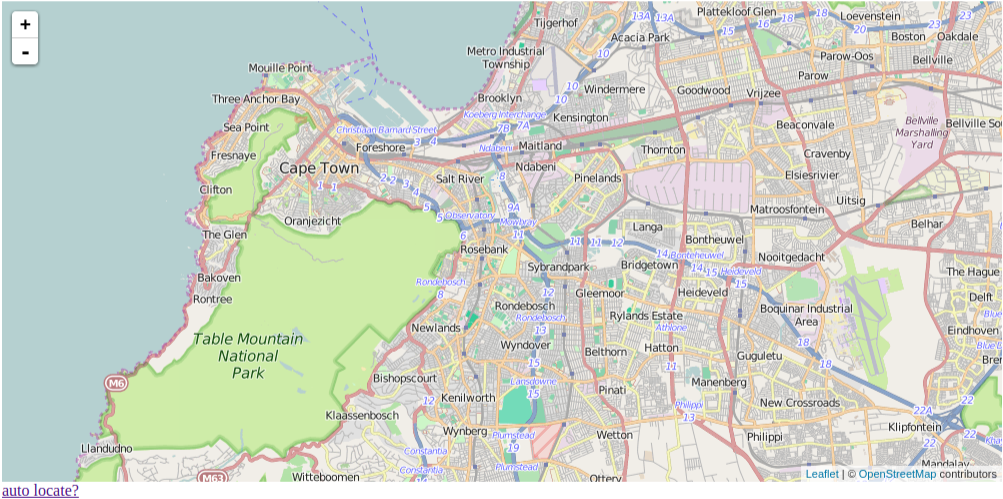
Tools are often a powerful lens on the data

- ✓ Brings data into a users context
- ✓ Allows exploration of thresholds and variability
- ✓ Generates more questions... that may or may not be answerable

## Select location for which you want to do the analyses

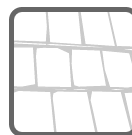
You need to select your location from a map below

- Click on the map at a location for which you want to do calculations. You can pan and zoom to find your location.
- Alternatively, press on the 'auto-locate' button. This should find the approximate position of where you are right now. You will be asked to let your location to be known. It is safe, but if you prefer not to do it, you can still find your location manually.
- After selecting the location, you can proceed to provide roof and tank parameters.

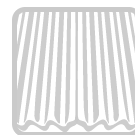


## Set roof and tank parameters

Please select a roof type.



Cement tile



Corrugated iron

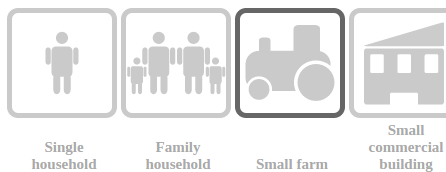
Please input your roof and tank parameters

<input type="text" value="200"/>	<input type="text" value="10"/>	<input type="checkbox"/>
Roof Area [m2]	Tank volume [kL]	First flush?



## Define your water use pattern (or water demand)

### Select your household type

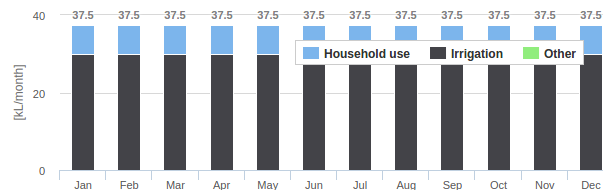


### Input your average monthly water usage

Household use [kL/month]	7.5
Irrigation [kL/month]	30
Other [kL/month]	0
Total monthly use [kL/month]	37.5

### ▼ Total usage in calendar months [kL/month] (optional)

### Water usage during each calendar month



Household use	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Irrigation	30	30	30	30	30	30	30	30	30	30	30
Other	0	0	0	0	0	0	0	0	0	0	0

Scale

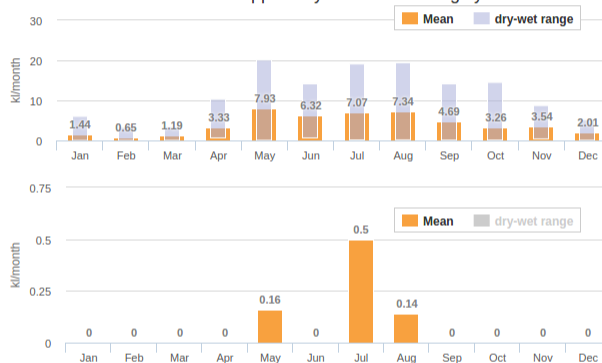


## Explore the results

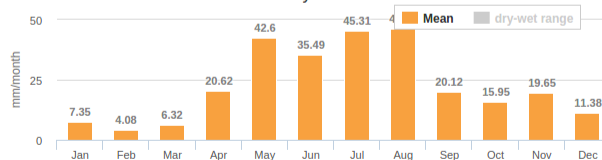


- Water supplied by the harvesting system
- Rainfall not captured by the system
- Monthly water deficit
- Monthly rainfall
- Mean tank storage
- Maximum tank storage
- Number of days with no supply
- Duration of no-supply period
- Roof runoff

Amount of water supplied by water harvesting system



Monthly rainfall



# Challenges?

- ✓ Lack of human capacity
  - ✓ Just me...
- ✓ Real time processing on large datasets is slow
  - ✓ Mostly focussed on daily or sub-daily source data
  - ✓ Can't do real time large grids for mapping
- ✓ Visualisation methods
  - ✓ Users don't see what you want them to see!
- ✓ Managing/structuring javascript
  - ✓ Managing Javascript through the CMS
- ✓ Allowing researchers to engage and develop visualisations and tools (in Javascript?)
  - ✓ Matplotlib/D3.js integrations?
- ✓ Maintaining integrations across institutions

# What are we really doing?

- ✓ Providing “information” to “real” decision makers in resource constrained/capacity constrained contexts
- ✓ Developing climate science literacy/capacity
- ✓ Developing very valuable relationships with primary data providers (Met Services)
- ✓ Exposing people to related information/data that may be useful

OR:

- ☐ Providing inappropriate data to people making or guiding important decisions?
- ☐ Providing a free tool for others to make money?
- ☐ Failing to describe limitations and caveats of the data and underlying methods?
- ☐ Developing user “trust” that is ill founded?
- ☐ Contributing to portal proliferation and general data “noise” on the internet

# What are we really doing?

## ✓ Defensible

- ✓ Can we defend the data we provide?
- ✓ Is it validated? Is it possible to validate? Is it fit for purpose?
- ✓ Do we really understand the limitations and caveats

## ✓ Transparent

- ✓ Do we fully communicate reasons why this dataset has value?
- ✓ Do we fully communicate the limitations and caveats?
- ✓ Do we fully communicate the validation statistics?
- ✓ Do we direct people to more appropriate data?

Capacity building  
(Face to face and  
e-learning)

Web platform

Co-exploration/  
User engagement

Formal reporting  
publication